Electronic Supporting Information

One- and Two-Electron Reduction of Triarylborane-Based Helical Donor-Acceptor Compounds

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General information

Compounds 1^1 , 2^1 and [K(18-crown-6)(THF)₂] naphthalenide² were synthesized according to literature procedures. THF and Et₂O were dried using an Innovative Technology Inc. solvent purification system (SPS), pentane was distilled from LiAlH₄, and all were stored over Na/K alloy in an argon-filled glovebox. Electronic absorption measurements were performed on a Varian Cary 5E UV/vis-NIR spectrophotometer and an Agilent 8453 diode-array UV/vis spectrophotometer. ¹H NMR spectra were recorded on a Bruker Avance 500 MHz (¹H, 500 MHz) spectrometer at room temperature. The residual peaks of the deuterated solvents were used as references for ¹H chemical shifts.

Synthesis of monoanions and dianions of compounds 1 and 2

Synthesis of $1 \cdot K_1$



In an argon-filled glovebox, **1** (10 mg, 0.0149 mmol, 1.0 equiv.), $[K(18\text{-crown-6})(THF)_2]^+$ naphthenide (9.4 mg, 0.0164 mmol, 1.1 equiv.), and THF (1 mL) were added into a 5 mL vial, and the mixture was stirred for 5 min to form a dark purple solution. The lid of the vial was removed, and the vial was placed inside a 25 mL vial containing pentane. The large vial was sealed and placed in a freezer in the glovebox (-30 °C). After one week, dark purple crystals formed and the structure was confirmed by single-crystal X-ray diffraction.

Synthesis of 1-K2



In an argon-filled glovebox, **1** (10 mg, 0.0149 mmol, 1 equiv.), $[K(18\text{-crown-6})(THF)_2]^+$ naphthenide (21.4 mg, 0.0372 mmol, 2.5 equiv.), and THF (1 mL) were added into a 5 mL vial, and the mixture was stirred for 10 min to form a dark blue solution. The lid of the vial was removed, and the vial was placed inside a 25 mL vial containing pentane. The large vial was sealed and placed in a freezer in the glovebox (-30 °C). After 3 days, dark blue powder precipitated. Because of biradicaloid character, the ¹¹B and ¹³C NMR were not obtained. ¹H NMR (500 MHz, THF-d₈): $\delta = 6.88-6.81$ (m, 8H), 6.37 (s, 2H), 6.36 (s, 2H), 5.45 (d, J = 7.5 Hz, 1H), 5.21 (d, J = 7.5 Hz, 1H), 4.89 (d, J = 9.5 Hz, 1H), 4.84 (t, J = 7.5 Hz, 1H), 4.40 (d, J = 9.5 Hz, 1H), 3.71 (s, 2H), 3.55 (s, 1H), 3.47 (d, J = 7.0 Hz, 1H), 3.27 (d, J = 7.0 Hz, 1H), 2.18 (s, 6H), 2.10-1.98 (m, 18H) ppm.





3

253 K

Figure S2. Temperature-dependent ¹H NMR spectra of $1 \cdot K_2$ in THF-d₈ at 500 MHz

Synthesis of 2.K1



In an argon-filled glovebox, **2** (10 mg, 0.0139 mmol, 1 equiv.), $[K(18\text{-crown-6})(THF)_2]^+$ naphthenide (8.7 mg, 0.0152 mmol, 1.1 equiv.), and THF (1 mL) were added into a 5 mL vial, and the mixture was stirred for 5 min to form a dark purple solution. The lid of the vial was removed, and the vial was placed inside a 25 mL vial containing pentane. The large vial was sealed and placed in a freezer in the glovebox (-30 °C). After one week, dark purple crystals formed and the structure was confirmed by single-crystal X-ray diffraction.

Synthesis of $2 \cdot K_2$



In an argon-filled glovebox, **2** (10 mg, 0.0139 mmol, 1 equiv.), $[K(18\text{-crown-6})(THF)_2]^+$ naphthenide (20 mg, 0.0346 mmol, 2.5 equiv.), and THF (1 mL) were added into a 5 mL vial, and the mixture was stirred for 10 min to form a dark blue solution. The lid of the vial was removed, and the vial was placed inside a 25 mL vial containing pentane. The large vial was sealed and placed in a freezer in the glovebox (-30 °C). After one week, dark blue crystals formed. Single crystal X-ray diffraction analysis revealed a disordered 1:1 co-crystal of the monoanion **2·K**₁ and the dianion **2·K**₂. Because of biradicaloid character and trace of **2·K**₁ in it, the ¹¹B and ¹³C NMR were not obtained. ¹H NMR (500 MHz, THF-d₈): $\delta = 6.97$, 6.62, 6.57, 6.33, 6.25, 5.47, 5.19, 4.82, 4.62, 4.48, 4.19, 4.13, 3.47, 3.38, 2.55, 2.35, 2.31, 2.15, 2.09, 1.83, 1.72 ppm.



Figure S3. ¹H NMR spectrum of 2·K₂ in THF-d₈ at 500 MHz

Single-crystal X-ray diffraction

Crystals suitable for single-crystal X-ray diffraction were selected, coated in perfluoropolyether oil, and mounted on MiTeGen sample holders. Diffraction data for 1.K1 and 1:1 2·K₁/2·K₂ were collected on a Rigaku Oxford Diffraction XtaLAB Synergy diffractometer with a semiconductor HPA-detector (HyPix-6000) and multi-layer mirror monochromated Cu- K_{α} radiation. Diffraction data for 2·K₁ were collected on a Bruker X8 Apex II 4-circle diffractometer with a CCD area detector using Mo-K_a radiation generated by a Nonius FR591 rotating anode and monochromated by multi-layer focusing mirrors. As these crystals were extremely unstable in air, they were rapidly mounted under an argon stream and cooled at 100 K using an Oxford Cryostream low-temperature device attached to the diffractometer. Data were collected at 100 K. The images were processed and corrected for Lorentz-polarization effects and absorption as implemented in the CrysAlis^{Pro} software from Rigaku Oxford Diffraction $(1 \cdot K_1 \text{ and } 1:1 \cdot 2 \cdot K_1 / 2 \cdot K_2)$ or in the Bruker software packages $(2 \cdot K_1)$. The structures were solved using the intrinsic phasing method (SHELXT)³ and Fourier expansion technique. All non-hydrogen atoms were refined in anisotropic approximation, with hydrogen atoms "riding" in idealized positions, by full-matrix least squares against F^2 of all data, using SHELXL software⁴ and the SHELXLE graphical user interface.⁵ The crystal of 1·K₁ consisted of two domains and, hence, a twin data reduction was performed. Only the larger domain (ca. 80%) was used in the structure refinement. Mercury⁶ and Diamond software⁷ were used for graphical representation. Crystal data and experimental details are listed in Table S1. CCDC 2044266 (1·K₁), 2044267 (2·K₁), and 2044268 (2·K₁ / 2·K₂) contain the supplementary crystallographic data for this paper. These data are provided free of charge by The Cambridge Crystallographic Data Centre.

	$1 \cdot K_1$	$2 \cdot K_1$	$2 \cdot K_1 / 2 \cdot K_2$
CCDC	2044266	2044267	2044268
Empirical formula	$C_{50}H_{46}BN\cdot$	$C_{54}H_{48}BN\cdot$	$C_{54}H_{48}BN$
	$C_{12}H_{24}KO_6$	$C_{12}H_{24}KO_6$	1.5(C ₁₂ H ₂₄ KO ₆)⋅
	$3(C_4H_8O)$		C ₄ H ₈ O
Formula weight (g·mol ⁻¹)	1191.41	1025.15	1248.96
Temperature (K)	100(2)	100(2)	100(2)
Radiation, λ (Å)	Cu _{Ka} 1.54184	Mo _{Kα} 0.71073	Cu _{Ka} 1.54184
Crystal size (mm ³⁾	$0.25 \times 0.18 \times 0.06$	$0.06 \times 0.09 \times 0.22$	$0.02 \times 0.08 \times 0.19$
Crystal color, habit	black block	red needle	dark purple plate
Crystal system	triclinic	triclinic	triclinic
Space group	$P \overline{1}$	$P \overline{1}$	P 1
Unit cell dimensions			
<i>a</i> (Å)	12.5786(3)	8.842(3)	13.5466(5)
$b(\text{\AA})$	16.3020(4)	13.762(6)	15.5380(6)
<u>c (Å)</u>	16.8804(3)	24.038(12)	18.5839(6)
α(°)	98.375(2)	73.438(9)	87.406(3)
β(°)	90.741(2)	86.260(12)	72.123(3)
γ (°)	103.958(2)	86.518(8)	67.804(3)
Volume (Å ³)	3319.24(13)	2795(2)	3435.8(2)
Ζ	2	2	2
$ ho_{ m calc} ({ m Mg}\cdot{ m m}^{-3})$	1.192	1.218	1.207
$\mu (\mathrm{mm}^{-1})$	1.149	0.148	1.411
<i>F</i> (000)	1282.0	1094	1337
θ range / °	5.298 - 70.058	2.311 - 26.403	2.512 - 72.761
Reflections collected	42082	99934	124255
Unique reflections	12455	11400	12277
R _{int}	0.0583	0.1598	0.0901
R_{σ}	0.0339	0.1156	0.0359
Parameters / restraints	935 / 586	684 / 0	1119 / 793
GooF on F^2	1.056	0.996	1.056
R_1 [I $\geq 2\sigma(I)$]	0.060	0.0580	0.0917
wR^2 (all data)	0.1818	0.1311	0.2932
Max. / min. residual	0.741 / -0.460	0.248 / -0.254	0.759 / -0.356
electron density $(e \cdot Å^{-3})$			

Table S1. Single-crystal X-ray diffraction data and structure refinements of $1 \cdot K_1$, $2 \cdot K_1$ and the1:1 co-crystal of $2 \cdot K_1 / 2 \cdot K_2$.



Figure S4. Alternate stacking arrangement of the $[K(18 \text{-} \text{crown-6})]^+$ cation and the [5]-helicene anion in $2 \cdot K_1$ in the solid state at 100 K. Weak interactions exist between the potassium ion and the helicene core. Atomic displacement ellipsoids are drawn at 50% probability, and hydrogen atoms are omitted for clarity.

Table S2. Selected bond lengths [Å] and angles [°] for 1, $1 \cdot K_1$, 2, $2 \cdot K_1$, and $2 \cdot K_1 / 2 \cdot K_2$ in the solid state at 100 K. Values for 1 and 2 are taken from our previous work.^[1] P1 and P4 designate benzene rings of the helicene bonded to boron and nitrogen, respectively, while P2, P3 and P5, P6 designate phenyl rings of the mesityl groups bonded to boron and nitrogen, respectively. P7 is the benzene ring of the helicene next to P1.

Compound	1	$1 \cdot K_1$	2	$2 \cdot K_1$	$2 \cdot K_1 / 2 \cdot K_2^{a}$
KC19/C16 (P7)				3.283(3)	3.083(4)
K…C20/C15 (P7)				3.206(3)	3.461(4)
KC22 (P3)				3.534(3)	3.249(5)
KC21 (P3)				3.296(3)	3.326(4)
CC (P7) ^b	1.354(2)	1.356(3)	1.351(3)	1.353(4)	1.362(6)
CC (P3) ^b	1.366(2)	1.368(3)	1.367(3)	1.360(4)	1.356(6)
B-C _{Hel}	1.557(3)	1.533(3)	1.555(3)	1.520(4)	1.592(16) / 1.43(2)
B-C _{Mes}	1.575(3)	1.598(3)	1.585(2)	1.597(4)	1.579(16) / 1.63(2)
B–C _{Mes}	1.575(3)	1.601(3)	1.579(2)	1.605(4)	1.612(16) / 1.58(2)
N-C _{Hel}	1.428(2)	1.398(3)	1.411(2)	1.420(4)	1.437(5)
N–C _{Mes}	1.405(2)	1.434(3)	1.432(2)	1.436(4)	1.443(6)
N–C _{Mes}	1.430(2)	1.447(2)	1.412(2)	1.419(4)	1.405(6)
$\angle P1_{Hel}$ -BC ₃	24.30(6)	4.95(9)	12.80(5)	12.53(12)	10.3(2) / 5.3(3)
∠P2 _{Mes} -BC ₃	51.41(6)	60.86(8)	62.89(5)	57.19(11)	52.5(3) / 60.1(4)
$\angle P3_{Mes}$ -BC ₃	54.99(6)	63.78(8)	64.58(5)	60.28(11)	55.5(4) / 58.9(4)
$\angle P4_{Hel}$ -NC ₃	66.42(6)	77.18(8)	29.24(5)	32.19(13)	38.62(18)
$\angle P5_{Mes}$ -NC ₃	7.99(7)	14.90(9)	29.60(6)	27.38(13)	31.5(2)
∠P6 _{Mes} -NC ₃	58.04(6)	57.82(9)	53.35(7)	65.44(12)	55.9(2)
$\angle P1_{Hel}$ -P4 _{Hel}	29.88(5)	32.04(7)	45.09(4)	39.74(10)	48.04(13)
	121.36(16)	120.48(16)	121.33(11)	120.4(2)	120.3(11) / 118.3(5)
$\angle C - B - C$	119.65(16)	119.51(18)	118.21(12)	119.3(2)	122.8(10) / 115.5(13)
	118.96(15)	119.97(18)	120.44(12)	120.2(2)	116.9(10) / 126.2(14)
	122.69(14)	121.91(16)	119.61(11)	117.2(2)	120.7(3)
\angle C–N–C	121.76(14)	119.28(16)	122.63(11)	122.4(2)	119.9(3)
	114.95(14)	114.32(16)	117.74(11)	115.9(2)	116.0(4)
$Sum \angle C – B – C$	359.97(16)	359.96(18)	359.98(12)	359.9(2)	360.0(11) / 360.0(2)
Sum ∠ C–N–C	359.40(14)	355.51(16)	359.98(11)	355.5(2)	356.6(4)

^a The B(Mes)₂ group is disordered. Hence, values are given for both parts.

^b These are the respective C–C distances between the carbon atoms that exhibit interactions with the potassium ion in $2 \cdot K_1$ and $2 \cdot K_1 / 2 \cdot K_2$.

EPR measurements

EPR measurements at X-band (9.85 GHz) were carried out at room temperature using a Bruker ELEXSYS E580 CW EPR spectrometer. The spectral simulations were performed using MATLAB 8.3 and the EasySpin 5.2.25 toolbox.⁸ Temperature-dependent EPR measurements at X-band (9.4 GHz) were carried out using a Bruker ELEXSYS E580 CW EPR spectrometer equipped with an Oxford Instruments helium cryostat (ESR900) and a MercuryiTC temperature controller. Solid-state EPR measurements at X-band (9.38 GHz) were carried out using a Bruker ELEXSYS E580 CW EPR spectrometer.



Figure S5. Temperature dependence of the CW X-band EPR spectra of $1 \cdot K_2$ in frozen tetrahydrofuran.



Figure S6. Three different representations of the temperature dependence of the double integral EPR intensity (A) of $1 \cdot K_2$ in frozen solution. Circles (\bigcirc) represent the experimental results and the red line corresponds to the fit with the Bleaney-Bowers equation. Analysis of the variable temperature EPR data gives a singlet-triplet gap of $2J = -360 \text{ cm}^{-1}$ ($\Delta E_{ST} = 4.3 \text{ kJ/mol}$).



Figure S7. Temperature dependence of the X-band EPR spectra of $2 \cdot K_2$ in frozen tetrahydrofuran.



Figure S8. Three different representations of the temperature dependence of the double integral EPR intensity (A) of $2 \cdot K_2$ in frozen solution. Circles (\bigcirc) represent the experimental results and the red line corresponds to the best fit with the Bleaney-Bowers equation. Analysis of the variable temperature EPR data gives a singlet-triplet gap of $2J = -390 \text{ cm}^{-1}$ ($\Delta E_{ST} = 4.7 \text{ kJ/mol}$).



Figure S9. Solid-state CW X-band EPR spectrum of dianion $1 \cdot K_2$ (*left*) at 145 K and the weak half-field signal at 167.5 mT observed for $1 \cdot K_2$, characteristic of the triplet state (*right*).



Figure S10. Solid-state CW X-band EPR spectrum of dianion $2 \cdot K_2$ at 145 K. The corresponding half-field signal could not be observed at this temperature and also not in the temperature range of 120 to 300 K.

Photophysical properties

UV/vis-NIR absorption spectra were measured on a Varian Cary 5E UV/vis-NIR spectrophotometer and on an Agilent 8453 diode array UV/vis spectrophotometer. All solutions used in photophysical measurements had concentrations of ca. 10^{-5} M in Et₂O. All absorption spectra were recorded in standard quartz cuvettes (1 cm × 1 cm) under argon.

Spectroelectrochemical measurements

Spectroelectrochemical experiments in reflection mode were performed using an Agilent Cary 5000 spectrometer in combination with a custom designed sample compartment consisting of a cylindrical PTFE cell with an Infrasil® wedge window (angled by 0.5°) and an adjustable two-in-one electrode (6 mm platinum disc working electrode, 1 mm platinum wire counter electrode). The potentials were adjusted with a Princeton Applied Research potentiostat (PAR 283) and referenced to a leak free Ag/AgCl reference electrode (Warner Instruments). All experiments were carried out at room temperature under an argon atmosphere.

Thin layer measurements were done by attaching the working electrode to the flat surface of a glass halfsphere and measuring 9 cycles with a scan speed of 2 mVs⁻¹. The voltammograms were referenced to the ferrocene/ferrocenium redox couple.



Figure S11. Thin layer cyclic voltammetry of compound 1 in dichloromethane (0.1 M $[nBu_4N][PF_6]$).



Figure S12. Thin layer cyclic voltammetry of compound 2 in dichloromethane (0.1 M $[nBu_4N][PF_6]$).

Theoretical studies

DFT calculations were carried out with the program package Gaussian 16 (Rev. B.01).⁹ The geometries were optimized without symmetry constraints using the (U)M062X functional¹⁰ in combination with 6-31G+(d) and 6-31G++(d) basis set¹¹ supplemented by diffuse functions.¹² Calculations for dianions $1 \cdot K_2$ and $2 \cdot K_2$ were carried out using the (U)M062X functional and the 6-31G++(d) basis set in combination with Truhlar and co-workers' SMD variation of PCM.¹³ The HOMOs and LUMOs in the unrestricted (UM062X) method were allowed to mix in order to destroy α - β and spatial symmetries. In a different approach, the stability of DFT

wavefunction was tested with stable=opt, which led to the same unrestricted wavefunctions. Gausview 6.0 was used to plot orbital surfaces. The lowest-energy vertical transitions were calculated by TD-DFT using the same level of theory and were further analyzed with the Multiwfn software.¹⁴

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	State		Vertical Transition Energy ^[a]		MOs (%) ^[b]	$\Lambda^{[c]}$	State Assignment
		[eV]	[nm]	Suchgury			rissignment
$1 \cdot K_1$	FC-D ₁	1.11	1117 (1104)	0.1380	SOMO \rightarrow LUMO (33) SOMO \rightarrow LUMO+1 (25) SOMO \rightarrow LUMO+2 (24)	0.568	LE
	FC-D ₂	1.38	917 (990)	0.3194	$SOMO \rightarrow LUMO(54)$	0.494	LE
	FC-D ₁	1.05	1184 (1176)	0.0071	SOMO \rightarrow LUMO (65) SOMO \rightarrow LUMO+4 (17)	0.538	LE
2·K1	FC-D ₂	1.27	977 (1030)	0.2932	SOMO \rightarrow LUMO+1 (40) SOMO \rightarrow LUMO+2 (18) SOMO \rightarrow LUMO+4 (16) SOMO \rightarrow LUMO+3 (16)	0.599	LE

Table S3. Calculated lowest energy transitions for $1 \cdot K_1$, and $2 \cdot K_1$. LE = local excited state; D = doublet.

^[a] Experimental values are given in brackets. ^[b] Major contributions are shown (>10%) ^[c] Tozer's Lambda index: *J. Chem. Phys.* **2008**, *128*, 044118



Figure S13. Frontier molecular orbitals (SOMO and LUMO) of $1 \cdot K_1$, and $2 \cdot K_1$ (as 1^{1-} and 2^{1-}). H-atoms are omitted for clarity. Isovalue: $\pm 0.03 \ [e \ a_0^{-3}]^{\frac{1}{2}}$.



Figure S14. Frontier molecular orbitals of $1 \cdot K_2$ (as 1^{2-} : singlet (open-shell), SMD=Et₂O). Hatoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$.



Figure S15. Frontier molecular orbitals of $1 \cdot K_2$ (as 1^2 : singlet (open-shell), gas phase). Hatoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$. $\Delta E_{\alpha\beta} = 0.413 \ eV$ (39.85 kJ/mol).



Figure S16. Frontier molecular orbitals of $1 \cdot K_2$ (as 1^{2-} : triplet, SMD=Et₂O). H-atoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$.



Figure S17. Frontier molecular orbitals of $1 \cdot K_2$ (as 1^2 : triplet, gas phase). H-atoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$.



Figure S18. Frontier molecular orbitals of $2 \cdot K_2$ (as 2^2 : singlet (open-shell), SMD=Et₂O). Hatoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$.



Figure S19. Frontier molecular orbitals of $2 \cdot K_2$ (as 2^2 : singlet (open-shell), gas phase). Hatoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$. $\Delta E_{\alpha\beta} = 0.393 \ eV$ (37.92 kJ/mol).



Figure S20. Frontier molecular orbitals of $2 \cdot K_2$ (as 2^2 : triplet, SMD=Et₂O). H-atoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$.



Figure S21. Frontier molecular orbitals of $2 \cdot K_2$ (as 2^{2-} : triplet, gas phase). H-atoms are omitted for clarity. Isovalue: $\pm 0.02 \ [e \ a_0^{-3}]^{\frac{1}{2}}$.

Table S4. Comparison between experimental and calculated geometric parameters of **1** and corresponding anion and dianion.



Compound	1 ^a	$1 \cdot K_1^a$	$1^{2} \cdot (cs)^{b}$	1 ² ·(os) ^c	1 ²⁻ (triplet) ^d
C3-C15	3.009(3)	3.037(3)	3.048	3.052	3.056
C15-C16	1.367(3)	1.377(3)	1.401	1.409	1.409
C13-C14	1.347(2)	1.359(3)	1.401	1.398	1.389
C9–C10	1.354(2)	1.356(3)	1.353	1.355	1.356
C2–C3	1.366(2)	1.368(3)	1.364	1.377	1.385
$B-C_{Hel}$	1.557(3)	1.533(3)	1.497	1.544	1.576
B–C _{Mes}	1.575(3)	1.598(3)	1.605	1.593	1.583
B-C _{Mes}	1.575(3)	1.601(3)	1.604	1.592	1.584
$N-C_{Hel}$	1.428(2)	1.447(2)	1.434	1.438	1.437
N–C _{Mes}	1.405(2)	1.434(3)	1.405	1.406	1.406
N–C _{Mes}	1.430(2)	1.398(3)	1.398	1.398	1.397
$\angle P1_{Hel}$ -BC ₃	24.30(6)	4.95(9)	12.09	19.32	29.07
∠PMes1-BC ₃	51.41(6)	60.86(8)	52.97	49.78	46.15
∠PMes2-BC ₃	54.99(6)	63.78(8)	50.71	48.26	45.32
$\angle P4_{Hel}$ -NC ₃	66.42(6)	77.18(8)	67.88	67.10	68.46
$\angle PTol1-NC_3$	7.99(7)	14.90(9)	19.49	18.26	18.86
$\angle PTol2-NC_3$	58.04(6)	57.82(9)	38.36	39.62	39.01
$\angle P1_{Hel}$ -P4 _{Hel}	29.88(5)	32.04(7)	29.31	28.53	27.60
	121.36(16)	120.48(16)	121.67	120.83	119.84
\angle C–B–C	119.65(16)	119.51(18)	121.24	120.50	119.65
	118.96(15)	119.97(18)	117.08	118.67	120.50
	122.69(14)	121.91(16)	119.82	120.16	120.15
\angle C–N–C	121.76(14)	119.28(16)	122.77	122.59	122.54
	114.95(14)	114.32(16)	117.30	117.17	117.29
Sum ∠ C–B–C	359.97(16)	359.96(18)	359.99	360.00	359.99
Sum ∠ C–N–C	359.40(14)	355.51(16)	359.89	359.92	359.98

cs = closed-shell, os = open-shell. ^a Experimental values. ^bM062X/6-31G++(d)/gasphase; <S²> = 0.0000.^c UM062X/6-31G++(d)/gasphase guess=mix; <S²> = 0.8097. ^d UM062X/6-31G++(d)/gasphase triplet;<S²> = 2.0203.

Table S5. Comparison between experimental and calculated geometric parameters of **2** and corresponding anion and dianion.



Compound	2ª	$2 \cdot K_1 / 2 \cdot K_2^{a,b}$	$2^2 \cdot (cs)^c$	$2^2 \cdot (os)^d$	2 ²⁻ (triplet) ^e
C3–C19	2.8629(18)	2.949(5)	2.876	2.896	2.939
C2–C3	1.367(3)	1.360(4)	1.362	1.370	1.373
C9-C10	1.351(3)	1.353(4)	1.356	1.362	1.370
C7-C11	1.443(2)	1.474(4)	1.471	1.470	1.433
C13-C14	1.356(3)	1.362(6)	1.405	1.397	1.362
C17-C18	1.349(2)	1.336(6)	1.361	1.359	1.400
C19-C20	1.367(2)	1.368(6)	1.372	1.374	1.401
B–C _{Hel}	1.555(3)	1.520(4)	1.496	1.537	1.553
B-C _{Mes}	1.585(2)	1.597(4)	1.605	1.595	1.591
B-C _{Mes}	1.579(2)	1.605(4)	1.606	1.597	1.595
N–C _{Hel}	1.411(2)	1.420(4)	1.433	1.433	1.438
N–C _{Mes}	1.432(2)	1.436(4)	1.399	1.398	1.398
N–C _{Mes}	1.412(2)	1.419(4)	1.411	1.410	1.409
∠P1 _{Hel} -BC ₃	12.80(5)	12.53(12)	12.27	16.87	19.42
∠PMes1-BC ₃	64.58(5)	60.28(11)	53.86	51.79	51.40
∠PMes2-BC ₃	62.89(5)	57.19(11)	50.34	47.76	46.67
$\angle P5_{Hel}$ -NC ₃	29.24(5)	32.19(13)	49.84	49.92	51.64
PTol1-NC ₃	29.60(6)	27.38(13)	28.71	29.96	29.68
PTol2-NC ₃	53.35(7)	65.44(12)	32.63	30.72	31.11
$\angle P1_{Hel}$ -P5 _{Hel}	45.09(4)	39.74(10)	42.53	44.50	43.41
	121.33(11)	120.4(2)	122.51	121.89	122.32
∠C–B–C	118.21(12)	119.3(2)	120.96	120.22	119.60
	120.44(12)	120.2(2)	116.51	117.87	118.05
	119.61(11)	117.2(2)	122.20	122.24	122.59
∠C–N–C	122.63(11)	122.4(2)	119.55	119.69	119.35
	117.74(11)	115.9(2)	118.10	118.02	118.01
$\overline{\text{Sum} \angle \text{C}-\text{B}-\text{C}}$	359.98(12)	359.9(2)	359.98	359.98	359.97
Sum∠C–N–C	359.98(11)	355.5(2)	359.85	359.95	359.95

cs = closed shell, os = open shell. ^a Experimental values. ^b The B(Mes)₂ group is disordered. Hence, values are given for both parts. ^c M062X/6-31G++(d)/gasphase; <S²> = 0.0000. ^d UM062X/6-31G++(d)/gasphase guess=mix; <S²> = 0.8048. ^e UM062X/6-31G++(d)/gasphase triplet; <S²> = 2.0340.

			<s<sup>2></s<sup>	E (eV)	ΔE_{ST} (eV)
	M062X/6-31G++(d)/ gasphase	-	0.0000	-54746.062393	
12-	UM062X/6- 31G++(d)/gasphase	guess=mix	0.8097	-54746.169326	
12-	UM062X/6- 31G++(d)/gasphase	triplet (sp)	2.0183	-54746.013837	0.16
	UM062X/6- 31G++(d)/gasphase	triplet (opt)	2.0203	-54746.044407	0.13
	M062X/6-31G++(d)/ gasphase	-	0.0000	-58925.377397	
2 ² -	UM062X/6- 31G++(d)/gasphase	guess=mix	0.8048	-58925.463827	
<u> </u>	UM062X/6- 31G++(d)/gasphase	triplet (sp)	2.0223	-58925.296766	0.17
	UM062X/6- 31G++(d)/gasphase	triplet (opt)	2.0340	-58925.424384	0.04

Table S6. Expectations values, energies and singlet-triplet gaps of the lowest states for the dianions $1 \cdot K_2$ and $2 \cdot K_2$ (as 1^{2-} and 2^{2-}) in gas phase.

Table S7. Expectations values, energies and singlet-triplet gaps of the lowest states for the dianions $1 \cdot K_2$ and $2 \cdot K_2$ (as 1^{2-} and 2^{2-}) in Et₂O.

			<s<sup>2></s<sup>	E (eV)	ΔE_{ST} (eV)
	M062X/6- 31G++(d)/SMD=Et ₂ O	-		-54751.039923	0.02
1 ²⁻	UM062X/6- 31G++(d)/SMD=Et ₂ O	guess=mix	0.3188	-54751.054994	
	UM062X/6- 31G++(d)/SMD=Et ₂ O	triplet (sp)	2.0193	-54750.567101	0.49
	UM062X/6- 31G++(d)/SMD=Et ₂ O	triplet (opt)	2.0261	-54750.885852	0.17
	M062X/6- 31G++(d)/SMD=Et ₂ O	-		-58930.416419	0.05
2 ² -	UM062X/6- 31G++(d)/SMD=Et ₂ O	guess=mix	0.3950	-58930.461623	
2-	UM062X/6- 31G++(d)/SMD=Et ₂ O	triplet (sp)	2.0255	-58930.063597	0.40
	UM062X/6- 31G++(d)/SMD=Et ₂ O	triplet (opt)	2.0355	-58930.338979	0.12

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XYZ-coordinates (Å)

1-K1 (as 11-	, doublet, gasp	hase) E = -547	769.79 eV	$1 \cdot K_2$ (as $1^{2} \cdot K_2$, closed-shell S	o, gasphase) E	= -54746.06 eV
С	10.75869857	5.44398662	4.87043424	С	10.75749269	5.33510348	4.90500178
Ν	10.84634652	6.12649012	3.64374277	Ν	10.84300281	6.06599902	3.71133219
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С	8.74569329	10.53729558	5.18385862	С	8.80650279	10.61264486	5.10258209
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Н	12.69541375	4.25297359	7.40291946	С	11.89768058	4.83332628	5.56710595

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Н	3.87857604	11.36820736	0.88944013	С	-0.81148809	11.57306728	2.19674400
С	1.85724489	12.02793370	1.32921910	Н	-1.83079470	11.40653885	2.55098907
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Н	0.37727290	18.06423932	6.62330776				

$1 \cdot K_2$	as 12-,	open-shell	S ₀ ,	gasphase)	E =	-54746.19 eV	
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15.06412574 5.98713881 -0.93363623

С	10.7412713	5.3727102	4.92213804
Ν	10.8033931	6.00308297	3.6763458

Н

$1 \cdot K_2$ (as 1^{2} , triplet, gasphase) E = -54746.04 eV

С	10.7989043	5.39882224	5.01206731
Ν	10.7862813	5.98050589	3.74159578

В	2.63540268	12.7684059	3.70355465	В	2.59524682	12.8008744	3.68779781
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Н	1.1499007	11.5443325	-0.68696598	Н	1.38255352	11.7042214	-0.81132043
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1∙K₂ eV	(as 1 ²⁻ , closed	l-shell S ₀ , SM	$D=Et_2O) E =$	-54751.03 1·K	² (as 1 ²⁻ , open-	shell S ₀ , SMD	=Et ₂ O) E = -54751.05 eV
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N D	2 (2011752	0.01020013	2.729(2075	В	2.63540268	12.7684059	3.70355465
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С	1.54349553	12.2975395	2.64461775
С	1.56678197	15.3896621	2.61178934
Н	1.40546516	16.4442859	2.35611369
Н	0.69949657	14.8156371	2.26244122
Н	2.42867368	15.0171236	2.04693191
С	1.31834065	17.4540259	7.17925264
Н	2.19191123	18.1100214	7.29653023
Н	1.01045529	17.1409372	8.18393153
Н	0.51066057	18.0606912	6.75263804
Н	15.0833041	6.13861648	-0.83876873

1·K₂ (as 1², triplet, SMD=Et₂O) E = -54750.89 eV

~	10 77 4 4070	5 00757005	1 000 0000
С	10.7744278	5.32757985	4.89260295
Ν	10.8452001	6.04578948	3.68496685
В	2.61725904	12.8112593	3.72304406
С	9.53625812	4.85819597	5.36280395
Н	8.64231576	5.03784173	4.77290077
С	8.74556412	10.4776051	5.14338694
С	9.44918332	4.17834184	6.57279546
Н	8.47464426	3.82740485	6.90847444
С	10.5776182	3.93302387	7.36411849
С	11.8029055	4.41635345	6.89771029
Н	12.7000846	4.26524742	7.49559353
С	11.9063792	5.10997949	5.69351126
Н	12.8718567	5.49464651	5.37727473
С	10.4600622	3.20172886	8.67794892
Н	11.4467984	2.98131927	9.09718695
Н	9.92398158	2.25305262	8.56032658
Н	9.90907354	3.79690264	9.41597433
С	11.9774692	6.01808398	2.85197191
С	12.8193294	4.89865227	2.76210295
Н	12.6099596	4.01643044	3.36010889
С	8.16356635	8.70835962	3.51779073
С	13.9145974	4.90089681	1.89959846
Н	14.5455195	4.01499117	1.85053351
С	8.52788896	11.7860938	5.67030128
Н	9.30060263	12.2114169	6.3107888
С	14.2091384	5.99846886	1.08703437
С	13.3534233	7.10435422	1.16919154
Н	13.5459961	7.97714462	0.5472107
С	12.2628486	7.12314864	2.03017962
Н	11.6128538	7.99259421	2.07174622
С	15.3958268	6.00307397	0.15597432
Н	15.8981259	5.03058765	0.15228314

Η	16.1331186	6.75883328	0.45258364
С	9.69411127	6.78776848	3.25062824
С	8.95450298	6.3026454	2.14991985
Н	9.25536094	5.37545981	1.66739478
С	7.87615865	7.05118693	1.69856583
Н	7.31986779	6.72492201	0.82136622
С	7.48170194	8.22195672	2.3550939
Н	6.67564476	8.80336737	1.92724056
С	9.35770096	7.98931861	3.90771495
С	9.92674087	9.77896018	5.46522203
Н	10.6291472	10.2408425	6.15899901
С	10.2076219	8.54502833	4.92227005
Н	11.1203766	8.02034294	5.19094143
С	6.33407138	11.899038	4.6180352
С	7.40645601	12.5029797	5.37388164
Н	7.26367113	13.5101752	5.76153372
С	3.95971934	12.0272335	3.88452405
С	5.11657198	12.5860255	4.46087475
Н	5.07575368	13.611831	4.83353716
С	4.11088765	10.6655961	3.49673292
Н	3.24149758	10.1311762	3.11137183
С	5.30927265	9.97510201	3.60201305
Н	5.31733461	8.92513841	3.32990738
С	7.78344114	9.8861109	4.2451902
С	6.49047337	10.5688729	4.11244992
С	1.82985766	15.3028578	4.03195364
С	2.31707849	14.0954325	4.61218008
С	2.16533895	15.2361117	6.78828046
Н	2.27273699	15.1903983	7.87343149
С	1.71958707	16.4231603	6.20362511
С	1.54996919	16.4260763	4.81749712
Н	1.19319258	17.3355869	4.33185389
С	2.87557679	12.8559531	6.78851748
Н	3.96521391	12.7312111	6.80810497
Н	2.47313077	11.9496614	6.32138652
Н	2.52760273	12.9022413	7.82684976
С	2.45942955	14.0968982	6.03146788
С	-0.30966261	12.4306128	4.43921448
Н	-0.32814708	13.5011533	4.68042107
Н	0.35773552	11.9593532	5.17111995
Н	-1.32128509	12.0358119	4.58784211
С	-1.50362348	11.0756131	-0.24605621
Н	-2.50506489	11.4175218	0.03711911
Н	-1.53950789	9.98065805	-0.31784609
Н	-1.28620446	11.4591429	-1.24928552
С	3.26209057	12.2490976	0.77452841

Н	3.74075633	13.1342761	1.21077128
Н	3.25498558	12.3549135	-0.31606922
Н	3.91090804	11.4012762	1.02426242
С	1.85784156	12.0632775	1.30294985
С	0.87361367	11.6797684	0.38568241
Н	1.16016115	11.5069322	-0.65306716
С	-0.46587383	11.5285414	0.75130128
С	-0.79746217	11.7914037	2.08192775
Н	-1.83587103	11.6831656	2.3989005
С	0.16210767	12.1786865	3.02366902
С	1.53319001	12.3247147	2.66644393
С	1.59449264	15.421986	2.54174474
Н	1.48471272	16.4725833	2.24913151
Н	0.68581822	14.8912852	2.22896112
Н	2.41908676	14.9866096	1.96621453
С	1.45332532	17.65486	7.03317559
Н	0.74395103	18.3245819	6.53508809
Н	2.37423465	18.2259586	7.20957678
Н	1.04073342	17.3941403	8.01433684
Н	15.0945327	6.23026326	-0.87298855

$2 \cdot K_1$ (as 2^{1-} , doublet, gasphase) E = -58927.18 eV

Ν	4.54645856	13.53190042	10.34854170
В	6.10771740	8.19277313	4.34826317
С	5.10738677	13.93590169	9.10582227
С	6.03729147	13.08512321	8.46045633
Н	6.35555248	12.17355788	8.95936607
С	6.51159865	13.39028550	7.21000128
Н	7.21579498	12.71656121	6.73545756
С	6.11967776	14.57726685	6.53078556
С	5.32843585	15.50481952	7.26135434
С	4.78509072	15.14096360	8.51675237
Н	4.12340072	15.83799264	9.02671488
С	6.58997726	14.91437456	5.20343427
С	6.55946083	16.27917629	4.82888576
С	5.77464784	17.20264139	5.59642338
Н	5.69993521	18.22788976	5.23883558
С	5.12830894	16.81952108	6.73020839
Н	4.50955872	17.52056499	7.28616439
С	7.17575917	13.95475469	4.28404528
С	8.09136134	14.46270923	3.31623066
С	8.15154271	15.85199901	3.06007575
Н	8.82169293	16.20524800	2.27828445
С	7.33409213	16.73285058	3.72692884

	$2 \cdot K_2$ (as $2^2 \cdot$,	closed-shell S	50, gasphase) E	= -58925.38 eV
70	Ν	4.48299573	13.56917080	10.33786862
7	В	6.14531835	8.21124612	4.37953811
27	С	5.05432897	13.99262701	9.09337058
33	С	6.00311795	13.16556990	8.44603985
07	Н	6.35091366	12.26487371	8.94804205
28	С	6.44146028	13.46014266	7.17986279
56	Н	7.14873335	12.79686920	6.69430715
56	С	6.00483476	14.63324115	6.48098046
34	С	5.17965203	15.54457582	7.22498700
37	С	4.67309809	15.17738613	8.48620027
38	Н	3.98404250	15.85092748	8.99592206
27	С	6.41552075	14.94579588	5.15079156
76	С	6.30700867	16.30559477	4.71394288
38	С	5.46160870	17.19485729	5.47040521
58	Н	5.29382078	18.19560725	5.07162895
39	С	4.88742433	16.82217099	6.64639999
39	Н	4.23490705	17.50516419	7.18983132
28	С	7.04170244	13.97603137	4.23982478
56	С	7.98172407	14.53015012	3.28392741
75	С	7.95954074	15.88856754	2.99093649
45	Н	8.63218165	16.26459348	2.21882139

7.05401454 16.76238862 3.61672882

С

Н	7.31817009	17.78949800	3.47066822	Н	6.98658947	17.80744611	3.32013409
С	6.85325152	12.56064368	4.25338368	С	6.75791547	12.60557591	4.21293316
С	7.68476207	11.65032123	3.52155376	С	7.61175678	11.68292553	3.47607518
С	8.73986451	12.19611438	2.70752642	С	8.68552123	12.26401708	2.69310226
Н	9.37089134	11.50345046	2.15359159	Н	9.34685367	11.58381423	2.15548623
С	8.89248902	13.53851207	2.56461857	С	8.83760249	13.60591327	2.57563682
Н	9.63213636	13.94305410	1.87571317	Н	9.60632235	14.01959467	1.92110781
С	5.67501969	12.00009564	4.84423091	С	5.60992428	11.99400968	4.84995312
Н	4.93644778	12.66615247	5.28074129	Н	4.85661458	12.64244401	5.29088607
С	5.44474165	10.65228664	4.84293281	С	5.42464816	10.64501363	4.86615221
Н	4.52127749	10.27867988	5.28577928	Н	4.51534994	10.25376860	5.32604566
С	6.34847294	9.69851614	4.25947125	С	6.33806027	9.69074025	4.26748190
С	7.44187490	10.27366423	3.56928571	С	7.41055401	10.32029300	3.53738482
Н	8.13752327	9.61710968	3.04550480	Н	8.12923662	9.67990958	3.02119122
С	5.07068764	7.56563924	5.38982173	С	5.12079151	7.55153704	5.42361187
С	4.12332542	6.59504731	4.96864826	С	4.22736509	6.52014989	5.01595761
С	3.28781515	5.95699581	5.88635890	С	3.41620188	5.85065241	5.93282194
Н	2.57316650	5.21579088	5.52620304	Н	2.74533804	5.06674725	5.57476870
С	3.35235485	6.22850745	7.25355357	С	3.44537655	6.14800255	7.29730717
С	4.27305453	7.18430295	7.67529927	С	4.30488353	7.16320894	7.70994048
Н	4.36278734	7.40524012	8.73984837	Н	4.36787637	7.40933029	8.77162393
С	5.11384671	7.85644061	6.77772062	С	5.12277863	7.86485257	6.81164400
С	3.98809997	6.20871723	3.51183362	С	4.12136622	6.10978008	3.56300692
Н	3.99320863	7.09020206	2.86261548	Н	4.11999883	6.98727232	2.90798518
Н	3.05272116	5.66370207	3.34376807	Н	3.19964835	5.54066117	3.38940698
Н	4.81859311	5.57220558	3.18531458	Н	4.97071656	5.48964843	3.25213032
С	2.44852484	5.51423236	8.22881767	С	2.57245211	5.39665452	8.27380657
Н	2.25312287	4.48626165	7.90486885	Н	2.50586003	4.33449920	8.00877624
Н	1.47657244	6.01675178	8.31989876	Н	1.54630176	5.78989698	8.29377592
Н	2.89400776	5.47583447	9.22847323	Н	2.96794831	5.46623466	9.29330004
С	6.08450229	8.85392470	7.37352425	С	6.03674166	8.91246207	7.40649331
Н	7.02267836	8.89780339	6.81294520	Н	6.97874442	8.97973590	6.85345028
Н	6.30086768	8.59992523	8.41740003	Н	6.23931558	8.69054567	8.46145695
Н	5.67131095	9.87121372	7.36304537	Н	5.59174445	9.91546833	7.36105958
С	6.93189811	7.19259691	3.41337124	С	6.99885951	7.19615060	3.47417469
С	6.92010491	7.29958067	2.00240765	С	7.01518817	7.26811563	2.05659966
С	7.61569629	6.37719562	1.21020803	С	7.72486704	6.32949214	1.29555679
Н	7.57307064	6.47676551	0.12475732	Н	7.70054235	6.40748769	0.20672135
С	8.35058532	5.33417329	1.76573719	С	8.44920062	5.29518341	1.88209113
С	8.36580075	5.22413089	3.15755263	С	8.43915980	5.21467348	3.27642029
Н	8.93336648	4.41537060	3.62000259	Н	9.00121261	4.41703263	3.76687260
С	7.67353833	6.12065351	3.97271586	С	7.73420797	6.13018039	4.06021244
С	6.14266252	8.38039308	1.28245940	С	6.24067451	8.32550057	1.30302563
Н	5.81610480	8.02667894	0.29789502	Н	5.98232504	7.97110009	0.29721372
Н	6.75303461	9.27921022	1.13107786	Н	6.81733361	9.25301515	1.20138498
Н	5.26678778	8.70223239	1.85196442	Н	5.32909891	8.60641691	1.83900197
С	9.12238526	4.36621864	0.90245548	С	9.23859380	4.31324295	1.05008873
Н	8.99259930	3.33386084	1.24609232	Н	9.12449472	3.28807216	1.42307127
Н	10.19735465	4.58452160	0.92371354	Н	10.31199709	4.54547365	1.06178468

Η	8.79456075 4.41977212 -0	.14079765 H	8.910544	23 4.33014823 0.00458066
С	7.73822929 5.91669764 5	.47063482 C	7.783480	93 5.96041287 5.56299372
Н	8.53011156 5.20577239 5	.73070491 Н	8.596282	16 5.28214164 5.85055287
Н	6.78982989 5.53285548 5	.86452092 Н	6.842640	51 5.55522428 5.95492625
Н	7.93644766 6.85910427 5	.99238528 Н	7.936837	08 6.92468669 6.05944082
С	4.05370900 12.21208352 1	0.47912106 C	3.914684	09 12.27956441 10.40348813
С	4.08897640 11.55757217 1	1.71925408 C	3.880162	97 11.55478516 11.60717608
Н	4.49185000 12.07583789 1	2.58491323 H	4.284841	00 11.99998637 12.51155948
С	3.61058333 10.25906794 1	1.84196224 C	3.345638	85 10.27260143 11.64543274
Н	3.64258909 9.77413610 12	2.81624968 H	3.329884	83 9.73591262 12.59363725
С	3.10894730 9.55521319 10	0.74105681 C	2.854933	08 9.64609383 10.49431416
С	3.10001789 10.20650593 9	9.50617534 C	2.927823	95 10.35759693 9.29508924
Н	2.73502504 9.68132582 8	.62546713 Н	2.595852	14 9.88576043 8.37201409
С	3.55003592 11.51816778 9	9.37234869 C	3.433879	79 11.65380533 9.24305513
Н	3.52608788 12.00024857 8	8.39934705 Н	3.491331	74 12.17364424 8.29166757
С	2.60681015 8.14126238 10).88868890 C	2.273410	90 8.25604458 10.55079849
Н	3.43060240 7.44227485 11	1.07937480 Н	1.997916	27 7.90959572 9.55070191
н	2.09911102 7.81023635 9	.97851943 H	1.376899	95 8.22314044 11.18300226
н	1.90287271 8.05479545 11	1.72405245 H	2.991789	29 7.53604659 10.96199853
С	4 34078774 14 48556101 1	1.36738666 C	4 419846	85 14 46717607 11 40926009
C	5 32575313 15 44778570 1	1.63896699 C	5 438602	72 15 42271005 11 59067364
н	6 24124004 15 44436721 1	1.05429164 H	6 265892	18 15 44207889 10 88774411
C	5 12841321 16 39644879 1	2 63315070 C	5 379902	94 16 33151033 12 63717938
н	5 90765982 17 13227378 1	2.82387158 H	6 186358	85 17.05500130 12.74988281
C	3 95867727 16 41905900 1	3 40301819 C	4 317369	22 16 33990361 13 55061435
C C	2 98739030 15 45576548 1	3.12849564 C	3 305341	60 15 39854650 13 35958983
н	2.06282571 15.45036777 1	3.12049504 С 3.70235497 Н	2 453494	09 15 38500400 14 03822028
C	3 16330405 14 50716123 1	2 12252641 C	3 342180	03 15.50500400 14.05022020 21 14.48363353 12.30958316
ч	2 38687338 13 77523004 1	1 01077304 H	2 527840	21 14.403033535 12.30950310 38 13.77787661 12.17762060
n C	2.5666904 17.45304510 1	1.91977394 II 4.48439809 C	4 276091	10 17 33382575 14 68504450
с u	2 70500904 17.45304510 1	4.48439809 C	4.270091	10 17.33382373 14.08304439
и и	4 55162102 17 28520664 1	5.24522861 H	5 125204	52 17 20245755 15 26707622
п	4.55102192 17.58520004 1	A 08618872	2 259459	22 17.20245755 15.50707022
п	2.80222174 17.52274755 1	4.98018872 П	5.536430	25 17.22140955 15.27192950
2∙K	$_2$ (as 2 ²⁻ , open-shell S ₀ , gasphase) E = -	58925.46 eV 2·K	L_2 (as 2^{2-} , triplet, ga	sphase) E = -58925.42 eV
Ν	4.40211277 13.6397409 10.35844	86 N	4.38090232 13	.614365 10.3001468
В	6.18525494 8.13889696 4.391445	99 B	6.17282843 8.1	5080657 4.46608732
С	5.01684784 14.037056 9.126848	07 C	5.05492136 14	.023671 9.09738968
С	5.98913227 13.207736 8.529625	09 C	6.09201343 1	3.23816 8.59361362
Н	6.32878273 12.3220213 9.064000	34 Н	6.41702944 12.3	9.13414765
С	6.47208065 13.4729964 7.27077	66 C	6.63221349 13	.553755 7.34057455
н	7.20885969 12.8075864 6.834846	52 Н	7.39281752 12.9	0029599 6.92053651
C	6 04338717 14 6247618 6 521794	42 C	6 18490145 14	5484881 6 58812848
C	5 177/370/ 15 5/21800 7 210022	. <u> </u>	5 27108/29 15	712171 7 21152752
	4 64004005 15 2105425 9 460102	70 C	J.27100430 15.	7/121/1 1.21132/33
C	4.04094095 15.2105455 8.468103	79 C	4.04948833 15.	0.000001 0.00010000
	0.0045500 15.0004014 0.010111			
Н	3.9345503 15.8934914 8.940111	27 Н	3.86832128 15.3	8003091 8.86042966
H C	3.934550315.89349148.94011126.4838276414.91247775.202912	27 H 91 C	3.86832128 15.3 6.66121447 14.9	3003091 8.86042966 3369641 5.23235138
H C C	3.934550315.89349148.94011136.4838276414.91247775.2029196.3662268416.26261864.7196144	27 H 91 C 84 C	3.86832128 15.3 6.66121447 14.3 6.61705648 16.3	3003091 8.86042966 9369641 5.23235138 3188632 4.82223535

Н	5.31893061	18.1483921	4.99704669	Н	5.75437141	18.2583493	5.14819337
С	4.8812633	16.8039921	6.58704313	С	5.05272936	16.8384562	6.62265449
Н	4.20672867	17.4922302	7.09575583	Н	4.38598832	17.5411223	7.1191805
С	7.15507729	13.9437229	4.32376596	С	7.24713254	13.969252	4.35351231
С	8.08123399	14.4661313	3.36882129	С	8.13140757	14.425684	3.32799824
С	8.08568813	15.8425218	3.05714534	С	8.2069346	15.8284861	3.04420222
Н	8.7640631	16.203638	2.28546212	Н	8.86561766	16.1555102	2.23918616
С	7.15889133	16.7025207	3.6508359	С	7.43081155	16.7263692	3.71147227
Н	7.08036249	17.7409048	3.32959206	Н	7.43911556	17.7814853	3.43759425
С	6.87909262	12.5458501	4.31421284	С	6.95951952	12.5418309	4.37327932
С	7.73900941	11.636326	3.60678208	С	7.78286158	11.6276129	3.65100226
С	8.80527203	12.1946199	2.82463508	С	8.80658662	12.1429649	2.7899052
Н	9.47464067	11.5102348	2.30348434	Н	9.43171566	11.4412098	2.24084416
С	8.93824137	13.541867	2.67602847	С	8.91342062	13.494419	2.59317118
Н	9.70029926	13.9514887	2.01247108	Н	9.62193271	13.889099	1.86389214
С	5.72054232	11.9557342	4.92128754	С	5.80329342	11.9901139	4.99453436
Н	4.97521811	12.6090389	5.3655271	Н	5.08452236	12.6638039	5.45140939
С	5.51116678	10.6021588	4.91229728	С	5.55974139	10.6385617	5.00746936
Н	4.59307567	10.216249	5.35796272	Н	4.64283033	10.2752288	5.47346941
С	6.42258405	9.65650608	4.32571195	С	6.44357646	9.67876169	4.41215332
С	7.51694541	10.2524936	3.66071281	С	7.53341754	10.2394387	3.73039727
Н	8.23794555	9.60753305	3.15338221	Н	8.22484857	9.57607368	3.20675523
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С	3.4821931	5.8121119	6.02209419	С	3.58066326	5.7863434	6.20473342
Н	2.79044354	5.0373	5.68454795	Н	2.8785922	5.00947636	5.89407743
С	3.5502198	6.11249391	7.3842194	C	3.73409427	6.05496446	7.56668553
С	4.43920604	7.11404853	7.77115613	С	4.62663733	7.0667085	7.91856057
Н	4.53402036	7.36122882	8.83032678	Н	4.77864535	7.29726753	8.97482365
С	5.24590462	7.79623051	6.85051816	C	5.36523441	7.77929556	6.96483452
С	4.11721592	6.0538869	3.63250344	C	4.05308629	6.09096545	3.78596227
Н	4.09488417	6.92930747	2.97443249	Н	4.00256129	6.97943849	3.14719323
Н	3.18832156	5.48669853	3.4945706	Н	3.11021122	5.53778038	3.69403926
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Н	1.6647525	5.7636146	8.41086221	Н	1.90771414	5.54574942	8.63471165
Н	3.10058466	5.46626197	9.39795849	Н	3.38124824	5.42860238	9.60452468
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Н	5.821359	9.83833361	7.33746939	Н	5.95504145	9.82577771	7.41405954
С	6.9652567	7.15999916	3.40045528	C	6.87879051	7.18798751	3.40873024
С	6.94630633	7.329611	1.98801685	C	6.78895849	7.39966052	2.00446215
С	7.60146687	6.42625152	1.14393424	C	7.38010256	6.51007848	1.10156508
Н	7.5482898	6.58051542	0.06429107	Н	7.27297655	6.69688446	0.031165

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Н	8.86418851	4.29397573	3.43559457	Н	8.72169865	4.28985531	3.26111623
С	7.67316748	6.02640217	3.88772595	С	7.59061556	6.02929042	3.82598728
С	6.17403617	8.45433528	1.33754296	С	6.00712943	8.55831761	1.4293251
Н	5.96374409	8.22046889	0.28673881	Н	5.7384264	8.3612746	0.38448403
Н	6.72276223	9.40269341	1.37616925	Н	6.5770265	9.4940947	1.46760111
Н	5.23013486	8.63945471	1.86169809	Н	5.09391337	8.74361161	2.00569014
С	9.04341016	4.38918236	0.71182356	С	8.75720761	4.46149332	0.53515104
Н	9.03651085	3.36247258	1.09678625	Н	8.78930861	3.43168924	0.90998707
Н	10.0945507	4.684473	0.59015319	Н	9.79263068	4.76761734	0.33278202
Н	8.59050709	4.37847285	-0.28644271	Н	8.22650458	4.45533032	-0.42410003
С	7.75300202	5.73903374	5.37098276	С	7.74669655	5.69788438	5.29393339
Н	8.53594076	4.99981275	5.58051171	Н	8.52687559	4.94046036	5.43838438
Н	6.80312393	5.35324828	5.76122685	Н	6.8133905	5.31625339	5.72627342
Н	7.96959411	6.65241039	5.93599562	Н	8.01033657	6.59082649	5.87167043
С	3.86303772	12.3392219	10.4404849	С	3.85278228	12.3092459	10.3512098
С	3.83780929	11.6269423	11.6522998	С	3.75860427	11.6004318	11.5594278
Н	4.22003508	12.0941517	12.555322	Н	4.0906683	12.0682859	12.4816829
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Н	3.34071107	9.80000805	12.6527371	Н	3.20160423	9.77316569	12.5313209
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С	2.94767959	10.3745419	9.34430415	С	2.99821621	10.3473428	9.20504767
Н	2.63854978	9.88206301	8.42411889	Н	2.7404832	9.85330271	8.27002057
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Н	1.453822	8.19845676	11.226544	Н	1.31186609	8.21899259	10.8814348
Н	3.09907331	7.57436083	11.0469803	Н	2.95284121	7.57557153	11.0307318
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С	5.29575757	15.5473932	11.5752451	С	5.20118337	15.5237741	11.5571968
Н	6.12241016	15.5800694	10.8722938	Н	6.06432746	15.5554231	10.8994658
С	5.20577453	16.4732162	12.6048052	С	5.05462836	16.4525652	12.5781619
Н	5.98859817	17.2244419	12.7038063	Н	5.82747539	17.2078472	12.7155569
С	4.14277716	16.4663098	13.5170599	С	3.94577028	16.4416572	13.433904
С	3.16211536	15.4876797	13.3436744	С	2.97790422	15.4613861	13.212698
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С	4.05856958	17.4902897	14.6220127	С	3.81080527	17.4548933	14.5441041
Н	3.92219517	18.5036642	14.2241395	Н	3.85487528	18.4806663	14.159102
Н	4.97038823	17.5012924	15.2315772	Н	4.61329133	17.3510742	15.2850901
Н	3.21526297	17.2800095	15.288378	Н	2.85708321	17.3366183	15.0692721

 $2 \cdot K_2 (as \ 2^2 \cdot, closed-shell \ S_0, \ SMD=Et_2O) \ E=-58930.42 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \\ 2 \cdot K_2 (as \ 2^2 \cdot, open-shell \ S_0, \ SMD=Et_2O) \ E=-58930.46 \ eV \ SMD=Et_2O) \ E=-589300.46 \ e$

Ν	4.48299573	13.5691708	10.3378686	Ν	4.4546703	13.6094811	10.3586775
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С	5.05432897	13.992627	9.09337058	C	5.0198118	14.0101626	9.10953096
С	6.00311795	13.1655699	8.44603985	C	5.97743401	13.1783711	8.4824846
Н	6.35091366	12.2648737	8.94804205	Н	6.33070036	12.2917706	9.00489918
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С	6.00483476	14.6332412	6.48098046	С	6.01019257	14.6211531	6.49834287
С	5.17965203	15.5445758	7.224987	С	5.17048536	15.5374783	7.21939698
С	4.67309809	15.1773861	8.48620027	С	4.64984329	15.1891298	8.48180461
Н	3.9840425	15.8509275	8.99592206	Н	3.96004446	15.8742271	8.97389638
С	6.41552075	14.9457959	5.15079156	С	6.43656613	14.9217562	5.16861848
С	6.30700867	16.3055948	4.71394288	С	6.32800405	16.2763023	4.7140172
С	5.4616087	17.1948573	5.47040521	C	5.46720094	17.1721163	5.44811103
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С	7.04170244	13.9760314	4.23982478	C	7.07629206	13.9468005	4.26686841
С	7.98172407	14.5301501	3.28392741	C	8.01833615	14.4908903	3.31324543
С	7.95954074	15.8885675	2.99093649	C	8.00935506	15.8540905	3.01371732
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С	6.75791547	12.6055759	4.21293316	C	6.78796793	12.5685581	4.23848079
С	7.61175678	11.6829255	3.47607518	C	7.63688449	11.648141	3.5022799
С	8.68552123	12.2640171	2.69310226	C	8.71717027	12.2196834	2.7270489
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Н	9.60632235	14.0195947	1.92110781	Н	9.65120436	13.9717218	1.96324353
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Н	4.51534994	10.2537686	5.32604566	Н	4.53773207	10.2239231	5.34836657
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С	7.41055401	10.320293	3.53738482	C	7.41984874	10.278332	3.54888675
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С	5.12079151	7.55153704	5.42361187	C	5.12229515	7.49097556	5.39905545
С	4.22736509	6.52014989	5.01595761	C	4.20173576	6.48519456	4.98770102
С	3.41620188	5.85065241	5.93282194	C	3.37387299	5.83290311	5.90523921
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С	4.30488353	7.16320894	7.70994048	C	4.3100624	7.10334534	7.68825543
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Н	4.11999883	6.98727232	2.90798518	Н	4.12190262	6.93997467	2.8697198

Н	3.19964835	5.54066117	3.38940698	Н	3.1340674	5.54879737	3.36227365
Н	4.97071656	5.48964843	3.25213032	Н	4.89457527	5.40167567	3.23670482
С	2.57245211	5.39665452	8.27380657	C	2.50625831	5.40802289	8.24438331
Н	2.50586003	4.3344992	8.00877624	Н	2.3768605	4.35582375	7.9668798
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С	7.01518817	7.26811563	2.05659966	С	6.98908597	7.27954353	1.99688302
С	7.72486704	6.32949214	1.29555679	С	7.72097102	6.38294005	1.20501151
Н	7.70054235	6.40748769	0.20672135	Н	7.68789485	6.48964764	0.1197851
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Н	9.00121261	4.41703263	3.7668726	Н	9.0645528	4.43818139	3.61353189
С	7.73420797	6.13018039	4.06021244	С	7.75297984	6.10705206	3.9654128
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Н	5.98232504	7.97110009	0.29721372	Н	5.95373587	8.00977697	0.24908715
Н	6.81733361	9.25301515	1.20138498	Н	6.72498827	9.28548721	1.2071906
Н	5.32909891	8.60641691	1.83900197	Н	5.24532485	8.55743288	1.79075255
С	9.2385938	4.31324295	1.05008873	С	9.29423546	4.41953763	0.89716686
Н	9.12449472	3.28807216	1.42307127	Н	9.17888895	3.3770964	1.21539415
Н	10.3119971	4.54547365	1.06178468	Н	10.3638097	4.65896993	0.95172741
Н	8.91054423	4.33014823	0.00458066	Н	8.99483973	4.48752967	-0.15391119
С	7.78348093	5.96041287	5.56299372	C	7.81520326	5.882327	5.46076863
Н	8.59628216	5.28214164	5.85055287	Н	8.65021347	5.22170082	5.71990737
Н	6.84264051	5.55522428	5.95492625	Н	6.89427064	5.42131439	5.8392552
Н	7.93683708	6.92468669	6.05944082	Н	7.94090582	6.82546389	6.00316166
С	3.91468409	12.2795644	10.4034881	C	3.91778145	12.3097527	10.4675036
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Н	2.59585214	9.88576043	8.37201409	Н	2.54025269	9.86015666	8.54410084
С	3.43387979	11.6538053	9.24305513	C	3.40185219	11.6518806	9.34122439
Н	3.49133174	12.1736442	8.29166757	Н	3.39736082	12.1541781	8.37809566
С	2.2734109	8.25604458	10.5507985	C	2.37392835	8.25450689	10.7642969
Н	1.99791627	7.90959572	9.55070191	Н	1.98489704	7.91099212	9.80123362
Н	1.37689995	8.22314044	11.1830023	Н	1.56212447	8.19205123	11.4988989
Н	2.99178929	7.53604659	10.9619985	Н	3.15440923	7.55221598	11.0817971
С	4.41984685	14.4671761	11.4092601	C	4.37658773	14.5347975	11.4190913
С	5.43860272	15.4227101	11.5906736	С	5.42402542	15.4442717	11.641293

Η	6.26589218	15.4420789	10.8877441	
С	5.37990294	16.3315103	12.6371794	
Н	6.18635885	17.0550013	12.7498828	
С	4.31736922	16.3399036	13.5506144	
С	3.3053416	15.3985465	13.3595898	
Н	2.45349409	15.385004	14.0382203	
С	3.34218021	14.4836335	12.3095832	
Н	2.52784938	13.7778766	12.1776297	
С	4.2760911	17.3338258	14.6850446	
Н	4.31219415	18.3660613	14.3166222	
Н	5.12530452	17.2024576	15.3670762	
Н	3.35845823	17.2214694	15.2719293	

Н	6.29577472	15.4187378	10.9933361
С	5.34827825	16.370186	12.6746744
Н	6.17576965	17.0618783	12.8241142
С	4.24106043	16.4268204	13.5317442
С	3.2027025	15.5213877	13.3009621
Н	2.3204592	15.5456114	13.937928
С	3.25696656	14.5960294	12.2595233
Н	2.42365158	13.9182739	12.0950109
С	4.18334738	17.4308741	14.6554064
Н	4.29249466	18.4549365	14.2804114
Н	4.9883568	17.2627751	15.3806418
Н	3.23136389	17.3688188	15.1915239

$2 \cdot K_2$ (as 2^{2-} , triplet, SMD= Et_2O) E = -58930.34 eV

N	4.38090232	13.614365	10.3001468
В	6.17282843	8.15080657	4.46608732
С	5.05492136	14.023671	9.09738968
С	6.09201343	13.23816	8.59361362
Н	6.41702944	12.3532779	9.13414765
С	6.63221349	13.553755	7.34057455
Н	7.39281752	12.9029599	6.92053651
С	6.18490145	14.6484881	6.58812848
С	5.27108438	15.5712171	7.21152753
С	4.64948833	15.1747381	8.43175862
Н	3.86832128	15.8003091	8.86042966
С	6.66121447	14.9369641	5.23235138
С	6.61705648	16.3188632	4.82223535
С	5.80143141	17.2301082	5.50647139
Н	5.75437141	18.2583493	5.14819337
С	5.05272936	16.8384562	6.62265449
Н	4.38598832	17.5411223	7.1191805
С	7.24713254	13.969252	4.35351231
С	8.13140757	14.425684	3.32799824
С	8.2069346	15.8284861	3.04420222
Н	8.86561766	16.1555102	2.23918616
С	7.43081155	16.7263692	3.71147227
Н	7.43911556	17.7814853	3.43759425
С	6.95951952	12.5418309	4.37327932
С	7.78286158	11.6276129	3.65100226
С	8.80658662	12.1429649	2.7899052
Н	9.43171566	11.4412098	2.24084416
С	8.91342062	13.494419	2.59317118
Н	9.62193271	13.889099	1.86389214
С	5.80329342	11.9901139	4.99453436
Н	5.08452236	12.6638039	5.45140939
С	5.55974139	10.6385617	5.00746936

Η	4.64283033	10.2752288	5.47346941
С	6.44357646	9.67876169	4.41215332
С	7.53341754	10.2394387	3.73039727
Н	8.22484857	9.57607368	3.20675523
С	5.24276837	7.49022455	5.57517839
С	4.30361831	6.47265645	5.22893237
С	3.58066326	5.7863434	6.20473342
Н	2.8785922	5.00947636	5.89407743
С	3.73409427	6.05496446	7.56668553
С	4.62663733	7.0667085	7.91856057
Н	4.77864535	7.29726753	8.97482365
С	5.36523441	7.77929556	6.96483452
С	4.05308629	6.09096545	3.78596227
Н	4.00256129	6.97943849	3.14719323
Н	3.11021122	5.53778038	3.69403926
Н	4.85726335	5.46413441	3.38143524
С	2.96991121	5.26558838	8.60242659
Н	3.01330622	4.1897753	8.39150162
Н	1.90771414	5.54574942	8.63471165
Н	3.38124824	5.42860238	9.60452468
С	6.34687948	8.80396962	7.48750252
Н	7.2772015	8.79391065	6.90919148
Н	6.57463948	8.61250261	8.5424906
Н	5.95504145	9.82577771	7.41405954
С	6.87879051	7.18798751	3.40873024
С	6.78895849	7.39966052	2.00446215
С	7.38010256	6.51007848	1.10156508
Н	7.27297655	6.69688446	0.031165
С	8.08702256	5.38457637	1.52376111
С	8.1751256	5.16278837	2.89860621
Н	8.72169865	4.28985531	3.26111623
С	7.59061556	6.02929042	3.82598728
С	6.00712943	8.55831761	1.4293251
Н	5.7384264	8.3612746	0.38448403
Н	6.5770265	9.4940947	1.46760111
Н	5.09391337	8.74361161	2.00569014
С	8.75720761	4.46149332	0.53515104
Н	8.78930861	3.43168924	0.90998707
Н	9.79263068	4.76761734	0.33278202
Н	8.22650458	4.45533032	-0.42410003
С	7.74669655	5.69788438	5.29393339
Н	8.52687559	4.94046036	5.43838438
Н	6.8133905	5.31625339	5.72627342
Н	8.01033657	6.59082649	5.87167043
С	3.85278228	12.3092459	10.3512098
С	3.75860427	11.6004318	11.5594278

Н	4.0906683	12.0682859	12.4816829
С	3.26179523	10.3003698	11.5795408
Н	3.20160423	9.77316569	12.5313209
С	2.86830521	9.64745667	10.4082298
С	2.99821621	10.3473428	9.20504767
Н	2.7404832	9.85330271	8.27002057
С	3.46722625	11.6567929	9.16959967
Н	3.57046826	12.1728079	8.21985362
С	2.31637717	8.24473262	10.4391478
Н	2.25354416	7.83294758	9.42798369
Н	1.31186609	8.21899259	10.8814348
Н	2.95284121	7.57557153	11.0307318
С	4.22441131	14.5312591	11.3437378
С	5.20118337	15.5237741	11.5571968
Н	6.06432746	15.5554231	10.8994658
С	5.05462836	16.4525652	12.5781619
Н	5.82747539	17.2078472	12.7155569
С	3.94577028	16.4416572	13.433904
С	2.97790422	15.4613861	13.212698
Н	2.09238915	15.4317771	13.8463
С	3.10146822	14.52697	12.1855619
Н	2.31873317	13.791884	12.0253989
С	3.81080527	17.4548933	14.5441041
Н	3.85487528	18.4806663	14.159102
Н	4.61329133	17.3510742	15.2850901
Н	2.85708321	17.3366183	15.0692721